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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants : Petter Ericson and Henrik Hoglind  
Serial No. : 09/784,550 G.A.U. 2673  
Filing Date : February 16, 2001  
For : CONTROLLING AN ELECTRICAL DEVICE

Assistant Commissioner for Patents  
Washington, D.C. 20231

RECEIVED

FEB 04 2002

Technology Center 2600

Sir:

PETITION TO THE COMMISSIONER  
UNDER RULE 1.78 (a)(6)

Applicants hereby petition the Commissioner pursuant to Rule 1.78 (a)(6), and any other applicable rules, to accept English-language translations of non-English language provisional applications.

Applicants filed this application on February 16, 2001. In the accompanying transmittal letter, as acknowledged in the official filing receipt, Applicants claimed the benefit under 35 U.S.C. § 119 of two provisional applications: No. 60/208,164, filed May 31, 2000, and No. 60/208,169, filed May 31, 2000.

Applicants filed those provisional applications in the Swedish-language and later filed English-language translations in

those provisional applications on October 6, 2000.

Applicants, however, did not file the English-language translations of the provisional applications in this application.

Rule 1.78(a)(5) currently states that an English-language translation of a non-English language provisional application must be submitted during the pendency of the non-provisional application and within the later of four months from the actual filing date of the non-provisional application or sixteen months from the filing date of the prior provisional application.

Applicants believed that this rule was satisfied by submission of the English-language translations of the provisional applications in the file of the provisional applications within the required time frame.

Applicants note that the Patent and Trademark Office has proposed an amended Rule 1.78 (a)(5)(iv) in agreement with Applicants' understanding. See 66 F.R. 46409 (September 5, 2001).

So as not to jeopardize any rights of Applicants to claim the benefit of the provisional applications, Applicants submit this petition under present Rule 1.78 (a)(6) on the ground that the filings in this application of the English-language translations of the provisional applications were unintentionally delayed.

In connection with this petition, Applicants state that the

entire delay between any date that the English-language translations were due to be filed and the date of this petition was unintentional.

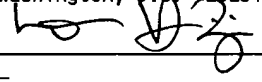
English-language translations of the above-mentioned provisional applications are attached hereto.

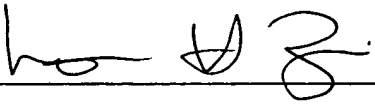
Applicants submit that no fee should be necessary in connection with this petition, including any fee under Rule 1.17 (t). However, if any fee is deemed necessary, please charge the fee to our Deposit Account No. 03-3125.

Respectfully submitted,

Dated: December 20, 2001

I hereby certify that this paper is being deposited this date with the U.S. Postal Service as first class mail addressed to:  
Assistant Commissioner for Patents,  
Washington, D.C. 20231.

 12/20/01  
\_\_\_\_\_  
Norman H. Zivin Date

  
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S/N 60/208,164

exp. 001012/6

**VERIFIED TRANSLATION**

I, the undersigned Patricia HARDING, BA(Hons),  
technical translator to RWS Group plc, of Europa House, Marsham Way, Gerrards Cross,  
Buckinghamshire, England, do hereby declare:

- (1) That I am well familiar with the Swedish and English languages;
- (2) That the attached is a true and accurate translation into the English language of the Swedish text of this Patent Application entitled "Input Unit Arrangement" that was filed in the US Patent and Trademark Office on 31 May 2000.
- (3) That all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under § 1001 of title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Dated this 21st day of August 2000

  
P. HARDING

For and on behalf of RWS Group plc

UNITED STATES PATENT APPLICATION

OF

PETTER ERICSON

AND

CHRISTER FÄHRAEUS

FOR

INPUT UNIT ARRANGEMENT

Technical field

This invention concerns an input unit arrangement with a mouse function and an input function, comprising image-recording means for recording images and signal-processing means for processing the images to achieve the mouse function and the input function. The invention also concerns an input unit arrangement with a mouse function, a mouse pad and use of an absolute position-coding pattern.

Background of the Invention

A mouse is used to position a cursor on a computer screen and to give various commands to the computer.

Currently, the most common mouse is an electronic type. However, an optical mouse is also available.

JP 09190277 discloses an optical mouse which has a CCD line sensor for the X-axis and a CCD line sensor for the Y-axis. Data which is recorded by the CCD line sensors at a particular time is compared with data which is recorded at a subsequent time, by means of which the movement of the mouse in the X- and Y-direction can be determined.

US Patent US 4,814,553 discloses a similar optical mouse which can determine its absolute position on a mouse pad which is provided with a specific line pattern.

The combination of a mouse function and an input function in an input unit is also known. An example of this is shown in the Applicant's Swedish Patent Appli-

cation No. 9803455-6. This describes an input unit which comprises image-recording means for recording images and image processing means for processing the images to achieve the input function and the mouse function. The mouse function is more specifically based on the determination of the relative positions of images recorded in succession.

It is a general requirement that a mouse or other input unit is to be able to carry out as many functions as possible and be used by the user in as flexible and simple a way as possible.

#### Summary of the Invention

An object of the invention is therefore to make it possible for the user to change between different functions of an input unit quickly and easily.

This object is achieved by an input unit arrangement according to claims 1 and 6, a mouse pad according to claim 12 and use according to claim 18.

An input unit arrangement according to the invention thus comprises image-recording means for recording images and signal-processing means for processing the images to achieve the mouse function and the input function, the input unit arrangement being arranged to change from the input function to the mouse function when the signal-processing means detect a predetermined position-coding pattern in one of said images.

Thus, instead of the user changing the function manually, the input unit arrangement automatically changes from the input function to the mouse function when the predetermined position-coding pattern is detected.

The position coding pattern is advantageously located on a mouse pad which is used together with the input unit arrangement. When the user places the input unit on the mouse pad, the image-recording means record an image of the position-coding pattern on the mouse pad. When the signal-processing means detect that the position-coding pattern is the predetermined one, the recorded images are processed in such a way that the mouse function is achieved.

In this connection it should be pointed out that by input function is meant here a function whereby the user can input information into a receiver for storage and processing within this, as distinct from the mouse function which is used for positioning purposes.

The whole input unit arrangement can be contained in one casing, that is in one physical unit. It can also be divided between two physical casings, for example a user unit which the user operates and a computer with which the user unit communicates, in which case part of the signal processing can be carried out in the computer. The signal-processing means can thus be fully integrated with



the image-recording means, can be partially integrated with these or are not integrated with these at all.

Of course, the input unit arrangement can also be suitably arranged to change from the mouse function to the input function when it detects another pattern than the predetermined position coding pattern in one of said images, so that an automatic change is also achieved for the input function. The other pattern can be an arbitrary pattern, that is the input unit arrangement detects that an image does not contain the predetermined position-coding pattern. It can also be another predetermined pattern, but does not need to be a position-coding pattern.

The first position-coding pattern is advantageously a first absolute position-coding pattern which codes a plurality of positions, the input unit arrangement being arranged to carry out the change from the input function to the mouse function when the signal-processing means detect one of said plurality of positions on the basis of the predetermined pattern.

An absolute position-coding pattern is advantageous as the identification of this requires little processor capacity in the input unit arrangement. The pattern can be detected in the form of the positions or coordinates which it codes. No matching of any previously stored pattern needs to be carried out. In addition, if the mouse function is based on position determination using an absolute position-coding pattern on a mouse pad, the

input unit arrangement only needs to be supplemented by a simple program routine which checks whether the positions lie within the area which is coded by the position-coding pattern on the mouse pad and activates the mouse function if this is the case.

The first absolute position coding pattern is advantageously part of a larger virtual absolute position-coding pattern which comprises a second absolute position-coding pattern, the arrangement being arranged to change from the mouse function to the input function when it detects a position which is coded by the second absolute position-coding pattern. The second absolute position-coding pattern can, for example, be dedicated to the recording of handwritten text, so that when the signal-processing means detect coordinates which are coded by this part of the pattern, the coordinates are processed as representing handwriting.

US 5,052,434 describes an example of an absolute position-coding pattern. The Applicant's Swedish Patent Applications SE 9901954-9 and SE 9903541-2, which were not publicly available at the time of filing the present application, describe other examples of absolute position-coding patterns. These patterns are used to digitize handwritten text which is written on a writing surface provided with this pattern. They can thus be used for an input function of an input unit for a computer. They can, however, also be used to achieve a mouse function of an

input unit. If the pattern codes a sufficiently large number of positions, a first part of the pattern, that is a particular position or coordinate area, can be dedicated to the mouse function and a second part of the pattern to the input function. The input unit can then automatically change from the input function to the mouse function when it detects a position situated within the part of the pattern dedicated to the input function, and from the mouse function to the input function when it detects a position situated within the part dedicated to the input function.

In addition, the first absolute position-coding pattern is advantageously divided into at least two domains, the input unit being arranged to achieve different functions depending upon which of said at least two domains is detected by the image-processing means.

The idea of dividing the absolute position-coding pattern into different parts can thus be utilized in a form of tree structure so that the area which is dedicated to the mouse function is divided into sub-areas, so called domains, to which are associated different functions of the input unit arrangement. In this way a user can cause the input unit arrangement to carry out different functions in a very simple way, depending upon where he places the input unit on a mouse pad.

The idea described above can of course be utilized for an input unit arrangement which has only a mouse function.

According to a second aspect of the invention, this concerns therefore an input unit arrangement with a mouse function which comprises image-recording means for recording images and signal-processing means for processing images to achieve the mouse function, the signal-processing means being arranged to detect an absolute position-coding pattern in one of said images, to determine a position based on the absolute position-coding pattern and to detect to which of at least two domains the position belongs, the input unit arrangement being arranged to carry out different functions depending upon which domain the signal-processing means detect.

The input unit arrangement thus contains information about at least two different domains of the absolute position-coding pattern and has different functions associated with these domains.

The input unit arrangement is advantageously arranged to generate a command for control of an external computer when it detects a predetermined one of said at least two domains. Instead of the user clicking with a mouse button, he can thus read the absolute position-coding pattern in a domain. He can then use the input unit arrangement in essentially the same way both for positioning a cursor and for giving a command to the

computer with which the input unit arrangement communicates.

The command can advantageously concern the opening of a program in the computer. The user can then for example cause the computer to open a program for electronic mail simply by placing the input unit arrangement on a domain which is dedicated to this.

In addition, the input unit arrangement is advantageously arranged to work in a relative mode when the signal-processing means detect a domain dedicated to relative mode and in absolute mode when the signal-processing means detect a domain dedicated to absolute mode.

The use of both a relative mode and an absolute mode increases the flexibility for the user.

The arrangement is advantageously arranged to work in a scrolling mode when the signal-processing means detect a domain dedicated to scrolling mode.

This thus replaces the scrolling roller which is to be found on some mechanical mice.

The input function advantageously comprises a scanner function so that the input unit can be used to input text and/or images.

According to a third aspect of the invention, this concerns a mouse pad which is provided with a position-coding pattern which is divided into at least two domains which are intended to achieve different functions of a mouse.

The advantages of this mouse pad are apparent from the above discussion of the input unit arrangement.

According to a fourth aspect of the invention, this concerns use of an absolute position-coding pattern to cause an input unit arrangement which has a mouse function to change from a first to a second function.

The advantages of this use are apparent from the above.

#### Brief Description of the Drawing

Embodiments of the invention will be described below in greater detail with reference to the accompanying drawing in which the figure shows diagrammatically an embodiment of an input unit arrangement according to the invention, an embodiment of a mouse pad according to the invention and a computer with which the input unit arrangement communicates.

#### Description of a Preferred Embodiment

The figure shows a mouse pad 100, a computer 200 and an input unit 300 for the computer. Together with programs in the computer 200, the input unit 300 forms an input unit arrangement according to the invention.

The mouse pad 100 is divided into a plurality of different areas. It has a first working field 110 for relative mouse function, a second working field 111 for absolute mouse function, a scrolling field 112, a scanner field 113 for changing to scanner function and a command

field 120 in which a number of predetermined commands are indicated

An absolute position-coding pattern 150 extends over the whole mouse pad. For the sake of clarity, the pattern is shown greatly enlarged on only a small part of the mouse pad.

The absolute position-coding pattern can be any type which systematically codes coordinates for a large number of positions on the mouse pad, so that the position of the input unit can be determined regardless of where the input unit is placed on the mouse pad.

The pattern can, for example, be of the type shown in US 5,852,434, where each position is coded by one specific symbol. However, it can advantageously be of the type shown in the Applicant's Swedish Patent Applications SE 9901954-9 and SE 9903541-2, where each position is coded by a plurality of symbols and each symbol contributes to the coding of several positions. These applications, which were not publicly available at the time of the filing of the present application, are incorporated herewith by reference.

In these latter applications the pattern is constructed of a small number of types of symbol. For example, it can be constructed of two different-sized dots which represent a one and a zero respectively or of a dot which can have four different positions in relation

to a raster point and in this way can code four different values.

The figure shows the position-coding pattern on the mouse pad constructed of dots 5 of two different sizes. These represent a one and a zero respectively. A number of such symbols, for example 5 x 5 symbols, combine to code the coordinates of a point on the mouse pad.

Different parts of the position-coding pattern, that is different co-ordinate areas or domains, can be associated with different functions, as will be described in greater detail below. For example, the coordinates which code positions within the scrolling field 112 can be associated with a scrolling function so that when the input unit arrangement detects coordinates which lie within the scrolling field it generates a scrolling command to the computer 200. As a result, the user can achieve scrolling simply by placing the input unit 300 in the scrolling field.

In this embodiment the input unit 300 has a mouse function and an input function, more specifically a scanner or reading pen function.

The input unit 300 has a casing 1 in the shape of a pen. One short side of the casing has a window 2 through which images are recorded for the different functions of the input unit.

The casing 1 contains principally an optics part, an electronic part and a power supply.



The optics component comprises a plurality of light-emitting diodes 6, a lens system 7 and an optical sensor 8 which constitutes the interface with the electronic part.

The light-emitting diodes 6 are intended to illuminate a surface which is then below the window.

The lens system 7 is intended to project an image of the surface which is below the window 2 onto the light-sensitive sensor 8 in as correct a way as possible. The optical sensor 8 can consist of a two-dimensional quadratic CCD unit (CCD = charge-coupled device) with built-in A/D converter. Such sensors are commercially available.

The power supply for the input unit is obtained from a battery 12.

The electronic part comprises a processor 20 with conventional associated circuits, such as various types of memory, and associated programs for carrying out the functions described here. The processor 20 forms part of the input unit arrangement's signal-processing means. The electronic part also comprises a transceiver 26 for transmitting information to/from the computer 200. The transceiver can be based on infrared technology or radio technology for transmission over short distances, for example in accordance with the Bluetooth standard. The electronic part further comprises buttons 27, by means of which the user can control the input unit, for example switch it on and off.

The computer 200 is an ordinary personal computer with circuits and programs which make possible communication with the input unit 300. However, in this embodiment this also contains software which constitutes part of the input unit arrangement's signal-processing means. The software stores information about which functions are associated with different domains of the position coding pattern. The software is shown symbolically by broken lines and reference numeral 210.

As mentioned, the input unit 300 has a scanner function and a mouse function.

The scanner function is used to record text. The scanner function can be of the type described in the Applicant's Swedish Patent No. 9604008-4, where text is recorded by recording a plurality of images with partially overlapping content and putting them together, after which the characters in the put-together image are localized, identified and stored in character-coded format.

The mouse function is used to control a cursor on the display 201 of a computer 200. The mouse function is achieved as follows. When the user moves the input unit 300 on the mouse pad 200, the image-recording means record images at a predetermined frequency. Each image reproduces part of the position-coding pattern on the mouse pad, which part is sufficiently large for the processor 20 to be able to determine the position of the input unit on the mouse pad. More specifically, the pro-

cessor 20 localizes the symbols of which the position-coding pattern is constructed in each image, translates the symbols into coordinates according to predetermined algorithms and sends the coordinates to the computer 200 via the transceiver 26. The software 210 interprets the coordinates and converts these into positioning signals for a cursor on the display 201 of the computer.

The arrangement described above is used in the following way. First assume that the user wants to use the input unit as an ordinary relative mouse. He places the input unit 300 in the first working field 110. The processor 20 detects the coordinates in the image recorded by the sensor 8 and sends the coordinates to the computer 200, in which the software 210 detects that the coordinates belong to the working field 110 and that they are therefore to be interpreted as relative mouse functions. As long as the software 210 receives coordinates which belong to the working field 110 it will generate commands to the computer 200 for moving the cursor on the screen 201 in a corresponding way to the way the user has moved the input unit over the working field 110. The working field 111 for absolute mouse function can be used in a corresponding way, with the difference that the software 210 maps positions in the working field 111 to positions of the cursor on the computer screen 201.

Assume next that the user edits a document in the computer 200. He can mark text in the same way as with

a traditional mouse by "clicking" with the buttons 27. Assume that the user first wants to replace a first piece of text with a second piece of text which is situated elsewhere in the text. The user marks the second piece of text using the input unit. Then he places the input unit in the command field which is labeled with the command "cut" on the mouse pad 100. The input unit then sends the coordinates read from this field to the software 210 in the computer 200 which identifies that the coordinates represent the command "cut" and creates the corresponding command for the word-processing application concerned, which cuts out the marked piece of text. The user next marks the first piece of text using the input unit and then causes the computer to paste the cut-out piece of text in place of the marked text by reading the coordinates for the command "paste" using the input unit.

Now assume that the user next wants to enter text from a newspaper in his document. He first positions the cursor in the required position using the mouse function of the input unit. Then he changes the input unit arrangement to the scanner function by placing the input unit on the scanner field 113 and scans in the text from the newspaper. The text is converted to character-coded format and transmitted to the software which generates commands for inserting the text in the position marked by the cursor.

Now assume that the user sees an interesting web address in the newspaper he is reading and wants to look at this web page. He places the input unit 300 on the command field 120 with the text "www". Reading coordinates in this field results in the software 210 creating a command which opens a web browser program in the computer 200. Then the user can change the input unit arrangement to the scanner function in the way described above and read the web address from the newspaper. The recorded text is transferred to the computer 200 which can open the page corresponding to the recorded address.

Finally, assume that the user wants to send an e-mail to a friend. He places the input unit on the e-mail field of the mouse pad. Reading a pair of coordinates in this field results in the software 210 generating a command to the computer which causes it to open the e-mail program. The user can then record the required e-mail address and even the content of the message using the scanner function.

In addition, the user can himself define which functions are to be implemented upon the detection of the coordinates within various domains, for example the one marked "user-defined" on the mouse pad 100. This can be carried out by means of the software 210.

As shown above, the user can carry out a number of functions in a convenient way by means of just one input unit which reads coordinates on a mouse pad.

Of course other functions besides the above mentioned scanner function and mouse function can be integrated into the input unit in order to further increase its usability. For example, it can have a function which makes it possible to record handwritten text. For this purpose a second position-coding pattern can be used, which codes coordinates for points within a different coordinate area to the one which is used on the mouse pad.

Other commands can be created in addition to those described above.

The above example is just one example of how the arrangement according to the invention can be designed. Based on the summary of the invention, a person skilled in the art can achieve a number of variants of this example.

For example, the input unit arrangement does not need to have both an input function and a mouse function. It can have just a mouse function, reading coordinates on the mouse pad being used in the same way as above but, of course, without any change to input function.

All functions do not need to be controlled by reading coordinates. Instead certain functions can be controlled using buttons on the input unit.

In the example above the signal-processing means are partially arranged in the input unit 300, and partially in the computer 200. This division can be changed and

more or less of the processing can be carried out in the input unit. In the extreme case it could be possible for the signal processing means to be completely integrated with the image-recording means in one and the same casing.

The input unit arrangement can communicate with any other type of computer-based device, for example a PDA or a mobile telephone.

What we claim and desire to secure by Letters Patent is:

1. An input unit arrangement with a mouse function and an input function, comprising image-recording means for recording images and signal-processing means for processing the images to achieve the mouse function and the input function, characterized in that the input unit arrangement is arranged to change from the input function to the mouse function when the signal-processing means detect a predetermined position-coding pattern in one of said images.
2. An input unit arrangement according to claim 1, wherein the input unit arrangement is arranged to change from the mouse function to the input function when it detects a different pattern to the predetermined position-coding pattern in one of said images.
3. An input unit arrangement according to claim 1 or 2, wherein the predetermined position coding pattern is a first absolute position-coding pattern which codes a plurality of positions, and wherein the input unit arrangement is arranged to carry out the change from the input function to the mouse function when the signal-processing means detect one of said plurality of positions on the basis of the predetermined position coding pattern.
4. An input unit arrangement according to claim 3, wherein the first absolute position-coding pattern is part of a larger virtual absolute position-coding pattern

(continued)



(continued claim 4)

which comprises a second absolute position-coding pattern, and wherein the input unit arrangement is arranged to change from the mouse function to the input function when it detects a position which is coded by the second absolute position-coding pattern.

5. An input unit arrangement according to claim 3 or 4, wherein the first absolute position-coding pattern is divided into at least two domains and wherein the input unit arrangement is arranged to carry out different functions depending upon which of said at least two domains the signal processing means detect.

6. An input unit arrangement with a mouse function comprising image-recording means for recording images and signal-processing means for processing the images to achieve the mouse function, characterized in that the signal-processing means are arranged to detect an absolute position-coding pattern in one of said images, to determine a position based on the absolute position-coding pattern and to detect to which of at least two domains the position belongs, the input unit arrangement being arranged to carry out different functions depending upon which domain the signal-processing means detect.

7. An input unit arrangement according to claim 5 or 6, which is arranged to generate a command for controlling an external computer when it detects a first of said at least two domains.

8. An input unit arrangement according to claim 7, wherein said command is a command for opening a program in the computer.

9. An input unit arrangement according to any one of claims 5-8, which is arranged to work in a relative mode when the signal processing means detect a domain dedicated to relative mode and in absolute mode when the signal-processing means detect a domain dedicated to absolute mode.

10. An input unit arrangement according to any one of claims 5-9, which is arranged to work in a scrolling mode when the signal-processing means detect a domain dedicated to scrolling mode.

11. An input unit arrangement according to any one of claims 1-5, wherein the input function is a scanner function or a text input function.

12. A mouse pad which is provided with a position-coding pattern, characterized in that the position-coding pattern on the mouse pad is divided into at least two domains which are intended to achieve different functions of a mouse.

13. A mouse pad according to claim 12, wherein each of said at least two domains is provided with a visual indication which makes it possible for a user to understand which function of the mouse is achieved by means of this domain.

14. A mouse pad according to claim 12 or 13, wherein at least one domain is intended for the generation of a command for controlling a computer.

15. A mouse pad according to claim 13, wherein the command concerns opening a program on the computer.

16. A mouse pad according to any one of claims 12-15, wherein said at least two domains comprise a domain which is dedicated to achieve an absolute mouse function of the mouse.

17. A mouse pad according to any one of claims 12-16, wherein said at least two domains comprise a domain which is dedicated to achieve a scrolling function of the mouse.

18. Use of an absolute position-coding pattern in order to cause an input unit arrangement which has a mouse function to change from a first to a second function.

## Abstract of the Disclosure

A mouse pad is provided with a position coding pattern which codes coordinates for a plurality of positions on the mouse pad. Different areas of the mouse pad are dedicated to different functions. An input unit arrangement can read the position-coding pattern. By placing the input unit arrangement in different places on the mouse pad, a user can cause the input unit arrangement to carry out different functions, such as changing automatically from the mouse function to an input function.

**VERIFIED TRANSLATION****RECEIVED****FEB 04 2002****Technology Center 2600**

I, the undersigned Patricia HARDING, BA(Hons),  
technical translator to RWS Group plc, of Europa House, Marsham Way, Gerrards Cross,  
Buckinghamshire, England, do hereby declare:

(1) That I am well familiar with the Swedish and English languages;  
(2) That the attached is a true and accurate translation into the English language of  
the Swedish text of this Patent Application entitled "Controlling an Electronic Device" that  
was filed in the US Patent and Trademark Office on 31 May 2000.

(3) That all statements made herein of my own knowledge are true and that all  
statements made on information and belief are believed to be true; and further that these  
statements were made with the knowledge that willful false statements and the like so made  
are punishable by fine or imprisonment, or both, under § 1001 of title 18 of the United States  
Code and that such willful false statements may jeopardize the validity of the application or  
any patent issued thereon.

Dated this 21st day of August 2000

  
P. HARDING

For and on behalf of RWS Group plc



UNITED STATES PATENT APPLICATION

OF

PETTER ERICSON

AND

HENRIK HÖGLIND

FOR

CONTROLLING AN ELECTRONIC DEVICE

### Field of the Invention

This invention concerns an arrangement and a method for controlling an electronic device.

### Background of the Invention

The Applicant's Swedish Patent No. 9604008-4 discloses a reading pen which can be used for recording text by imaging this. The reading pen has an optical sensor which captures a number of images, with partially overlapping content, of the text which is to be recorded. In addition, the reading pen has a processor which puts together the images, identifies the text in the images and stores it in character-coded format. The text can then be transferred to a computer with which the reading pen communicates.

In addition, the Applicant's Swedish Patent No. 9803456-4 discloses an optical mouse which is arranged to position a cursor on a display of a computer.

The reading pen and the optical mouse are two examples of input units which can be used to input information into a computer or to control the function of a computer. Another example of an input unit is a keyboard, which can be used both to enter information and to control the computer by means of various keyboard commands.

A user does not want to have to change between different input units in order to be able to carry out different functions. Therefore it is a general requirement that each input unit is to be able to be used for as many

different functions as possible and in as flexible and simple a way as possible for the user.

#### Summary of the Invention

An object of this invention is therefore to provide an arrangement for controlling an electronic device which is simple for a user to use and which makes possible a combination with other input unit functions.

This object is achieved by an arrangement according to claim 1.

According to a first aspect, this invention concerns an arrangement for controlling an electronic device comprising an input unit with an optical sensor for recording text by imaging this by means of at least one image, and signal-processing means for identifying predetermined information in the imaged text and for controlling the electronic device dependent upon said predetermined information.

According to the invention the arrangement for controlling an electronic device is based on an input unit function known per se, that is recording of text, which, however, is modified by making the signal-processing means identify predetermined information in the imaged text. Unlike the previously known input unit function, the content of the recorded text is interpreted instead of the text just being stored. A user can thus control the electronic device on the basis of text which is read using the input unit. The text can be predetermined com-



mands which are printed or written on a sheet of paper or some other product. The text can also be text which is used in specific applications in the electronic device, such as addresses. The content in these addresses varies, but the arrangement can recognize predetermined information, for example certain characters, which make it possible for the arrangement to interpret what the text refers to.

The arrangement according to the invention is simple for the user to use, as the user just needs to pass the input unit across the text or place it on the text in order to control the electronic device. In addition the arrangement can easily be combined with other input unit functions which are based on recording of images by an optical sensor.

The signal-processing means are preferably realized as software. However, they can consist of a specially adapted hardware circuit, for example an ASIC, or some suitable combination of software and hardware.

The electronic device which is controlled by means of the arrangement can be a computer, a mobile telephone, a PDA or some similar electronic device.

The optical sensor can be a line sensor, but is preferably an area sensor.

In a preferred embodiment, the predetermined information consists of at least one predetermined character and the signal-processing means are arranged to generate

a command associated with said character for controlling the electronic device. The signal-processing means can be arranged to identify special characters such as @, or predetermined words, word combinations or character combinations. Each such character, word or combination can be associated with a special command. The command can be a command to the electronic device at system or application level. It can emulate a keyboard command. It can also be a special command, for example a user-defined command.

The arrangement can advantageously comprise a reading pen function. The same arrangement can then be used by the user both for controlling the electronic device and for inputting text into it. The reading pen function can advantageously be realized in the same way as in the Applicant's above-mentioned patent. Other realizations are, however, also possible.

In an advantageous embodiment, as an alternative to or a supplement to the reading pen, the arrangement can comprise an optical mouse function for controlling a cursor on a display on the electronic device. The user can then carry out mouse functions using the arrangement and also control the electronic device by recording text. The mouse function can advantageously be realized in the same way as in the Applicant's above-mentioned patent. Other realizations are, however, also possible.

The arrangement can advantageously be changed between at least a first function mode, for example the reading pen or mouse function, and a second command mode, in which the signal-processing means are arranged to carry out said identification of predetermined information in the recorded text and control of the electronic device. This embodiment has the advantage that it simplifies the arrangement, as it only needs to interpret text in command mode. The danger of text which is only intended to be entered and stored in the electronic device being wrongly interpreted as a command is also avoided.

As an alternative, the signal-processing means should be able to interpret continuously the content in the text recorded by the optical sensor. In order to avoid words being interpreted as a command which are only intended to be entered and stored in the electronic device but which consist of the same character combination as a command, additional requirements can be made regarding what the signal-processing means are to interpret as a command. For example, it can be required that commands are to consist of characters in a particular font, font size or the like.

In one embodiment the signal-processing means are at least partially located in the same casing as the electronic device. By this means the input unit can be made simpler and cheaper. In addition the processor power which is already available in the electronic device can

be utilized in order to carry out the functions of the signal-processing means. Certain processing of the recorded text can, however, advantageously be carried out in the input unit, for example localization of the text in the image or images and conversion of the text to character-coded format, for example ASCII code, so that a smaller amount of information needs to be transmitted from the input unit to the electronic device.

In a less preferred embodiment the signal-processing means can be completely integrated with the input unit so that the electronic device receives one or more commands directly from the input unit. In another less preferred embodiment the input unit can just record images and transfer these to the signal-processing means which carry out all the processing of the images.

The input unit is advantageously arranged to communicate with the electronic device by wireless means, so that the use of the input unit is as flexible as possible and so that certain functions can be used stand-alone. Alternatively, communication via a cable could be possible, for example across a USB.

In a particularly preferred embodiment the signal-processing means are arranged in such a way that when they identify an address for electronic mail in the recorded text, the electronic device is caused to open a program for electronic mail. The arrangement preferably causes the device not just to open the program but also

to open a template for electronic mail. It is even more preferable for the template to be opened with the recorded e-mail address already entered in the address field.

The identification of the e-mail address can, for example, be carried out by recognition of @, the signal-processing means interpreting all the characters which are associated with @ as part of the address.

In addition the signal-processing means can advantageously be arranged so that when they identify a web address in the recorded text the electronic device is caused to open a web search program. The device is preferably caused not just to open the program but also the web page corresponding to the web address. The identification of the web address by the signal-processing means can, for example, be based on recognition of the character combination "http://" or "www", the signal-processing means interpreting all the characters which are associated with said character combination as part of the web address. In this way the user can simply and quickly open a web page by using the same input unit he or she uses for other input unit functions.

In addition the signal-processing means can advantageously be arranged so that when they identify a telephone number in the recorded text, the electronic device is caused to ring the telephone number.

As mentioned above, the signal-processing means can create a predetermined command upon recognition of one or

more predetermined characters or words in the recorded text. The predetermined words can quite simply be designation of the commands which are created. For this purpose the arrangement can advantageously comprise a product by means of which a number of command indications are shown. The command indications can advantageously be represented by character combinations which are easy for the user to understand. The product can, for example, be a mouse pad.

According to a second aspect of the invention, this concerns a method for controlling an electronic device, comprising the steps of recording text by means of a hand-held input unit by imaging this by means of at least one image, identifying predetermined information in the imaged text, and controlling the electronic device depending upon the imaged text.

The advantages of this method are apparent from the discussion of the arrangement. Where appropriate, characteristics of the arrangement also apply for the method.

In the Applicant's Swedish Patent Application No. 9803455-6 an input unit is also known which has both an image-based mouse function and an image-based input function. The function of the input unit is changed by the user pressing buttons.

An additional object is to simplify the use of an input unit which has two functions so that the change between different functions can be carried out in a con-

venient way for the user. This object is achieved by means of a device according to claim 13.

More specifically, according to a third aspect, the invention comprises an input unit which has at least a first and a second function. The input unit comprises image-capturing means, for example an optical sensor, for capturing images and image-processing means, for example a processor, for processing the images to achieve the above-mentioned two functions. The input unit is arranged to change from the first to the second function when the image-processing means detect predetermined information in one of said images.

The predetermined information can in principle be any information which makes it possible for the input unit to interpret that it is to change from a current function to a new function. The information can, for example, consist of one or more predetermined characters, symbols, words, text in special font or line thickness or the like. When the input unit identifies the predetermined information, it automatically changes to the required function. In this way the user does not need to press any buttons.

In a preferred embodiment, the predetermined information is a predetermined pattern. If the input unit, for example, has a mouse function and another function, it can be programmed to be able to identify the pattern on a mouse pad. When the user places the input unit on the

mouse pad, the image-capturing means record an image of the pattern on the mouse pad. The image-processing means identify the pattern as predetermined information which indicates mouse function and the input unit changes automatically to mouse function and processes the images to achieve the mouse function.

It is, of course, convenient if the input unit is also arranged to change from the second function to the first function when it detects other predetermined information. If the input unit has only a mouse function and an input function, it can, for example, change back from the mouse function to the input function when the image-processing meant detect that the predetermined pattern for the mouse function is no longer present in the captured images. Alternatively, the change can be carried out on the basis of positive identification of another predetermined pattern.

In an advantageous embodiment, the predetermined information consists of a position-coding pattern, preferably an absolute position-coding pattern.

The advantage of position-coding patterns is that the predetermined information can consist of one or more specific positions. This makes it easier for the device to identify when it is to change, as it does not need to carry out any character recognition (OCR).

Absolute position-coding patterns are known for example from US 5,852,434 and the Applicant's SE 9901953-1 and



9903541-2 which were not publicly available at the time of the filing of the present application.

The functions between which the change is made can, for example, be a mouse function, a scanner function, a handwriting/hand-drawing function or some similar function which can be carried out on the basis of captured images.

#### Brief Description of the Drawing

This invention will now be described in greater detail by means of one embodiment with reference to the accompanying drawing in which the figure shows schematically how an arrangement according to the invention can be constructed and used.

#### Description of a Preferred Embodiment

An embodiment of the arrangement is described below which comprises a mouse function, a scanner or reading pen function and a control function which is based on text recording.

The figure shows a mouse pad 100, an electronic device 200 in the form of a computer and an input unit 300 for the computer.

The mouse pad has a working field 100 with an irregular pattern (not shown) which makes it possible to determine the relative positions of two images which have partially overlapping contents by means of the content of the images, and a command field 120, in which a number of predetermined commands are indicated.

The input unit 300 has a casing 1 in the shape of a pen. One short side of the casing has a window 2 through which images are captured for the different image-based functions of the input unit.

The casing 1 contains principally an optics part, an electronics part and a power supply.

The optics part comprises a number of light emitting diodes 6, a lens system 7 and an optical sensor 8 which constitutes the interface with the electronics part.

The light emitting diodes 6 are intended to illuminate a surface which is at the moment below the window.

The lens system 7 is intended to project an image of the surface which is below the window 2 onto the light-sensitive sensor 8 in as correct a way as possible. The optical sensor 8 can consist of a two-dimensional quadratic CCD unit (CCD = charge-coupled device) with a built-in A/D transducer. Such sensors are commercially available.

The power supply for the input unit is obtained from a battery 12.

The electronics part comprises a processor 20 with conventional associated circuits, such as various types of memory, and associated programs for carrying out the functions described here. The electronics part also comprises a transceiver 26 for transmitting information to/from the computer 200. The transceiver can be based on infrared technology or radio technology for transmission

over short distances, for example in accordance with the Bluetooth standard. The electronics part further comprises buttons 27, by means of which the user can control the input unit and in particular change the input unit between the mouse function, the scanner function and the control function. When the mouse function is being used the buttons can also have functions which correspond to the click buttons on a traditional mouse.

The computer 200 is an ordinary personal computer with circuits and programs which make possible communication with the input unit 300. However, in this embodiment this also contains signal-processing means which constitute part of the arrangement for controlling its function. The signal-processing means consist of a program which is installed in the computer. This is shown symbolically by broken lines and reference numeral 210.

As mentioned, the input unit 300 has a scanner function, a mouse function and a control function.

The scanner function is used to record text. The user passes the input unit across the text which he wants to record. The optical sensor records images with partially overlapping contents. The images are put together by the processor 20. Each character in the put-together image is localized and, using for example neural network software in the processor, it is determined to which ASCII character the character corresponds. The text converted in this way to character-coded format can be stor-

ed in the input unit or transferred to the computer 200. The scanner function is described in greater detail in the Applicant's Swedish Patent No. 9604008-4.

The mouse function is used to control a cursor on the display 201 of a computer 200. The mouse function is also image-based in this embodiment. When the input unit 300 is moved across the working field 110, the optical sensor 8 records a number of images with partially overlapping images. The processor 20 determines positioning signals for the cursor of the computer 200 on the basis of the relative positions of the recorded images, which are determined by means of the contents of the images. The mouse function is described in greater detail in the Applicant's Swedish Patent No. 9803456-4.

The control function is based on the scanner function. The user records text in the same way as in the scanner function. The text is sent in character-coded format from the input unit's transceiver to the signal-processing means 210 in the computer 200, together with an indication that this is control information which is to be interpreted. The signal-processing means examine the received text and search for predetermined information in this in the form of predetermined characters and character combinations. When such predetermined information is found, the signal-processing means create predetermined commands to the computer as a function of the predetermined information.

The arrangement described above is used in the following way. First assume that the user wants to use the input unit as a mouse. He selects the mouse function by means of the buttons 27. By moving the input unit on the working field he controls the cursor on the display 201 of the computer 200. Assume next that the user edits a document in the computer 200. He can then mark text by "clicking" with the buttons 27. Assume that the user first wants to replace a first piece of text with a second piece of text which is situated elsewhere in the text. The user marks the second piece of text using the input unit. Then he changes the input unit to the control function and records the command "cut" by passing the input unit across this command on the mouse pad 100. The input unit then sends the character-coded text "cut" to the signal-processing means 210 in the computer 200, which identify the text as a command and create a corresponding command for the word-processing application concerned, which cuts-out the marked piece of text. The user next marks the first piece of text using the input unit and then causes the computer to paste the cut-out piece of text in place of the marked text by recording the command "paste" using the input unit.

Now assume that the user next wants to enter text from a newspaper in his document. He first positions the cursor in the required place using the mouse function of the input unit. Then he changes the input unit to the

scanner function and scans in the text from the newspaper. The text is converted to character-coded format and transmitted to the signal-processing means which insert the text in the position marked by the cursor.

Now assume that the user sees an interesting web address in the newspaper he is reading and wants to look at this web page. He then changes the input unit to control function and reads off the web address from the newspaper. The recorded text is transferred to the signal-processing means which identify the character combination "http://" and cause the computer to open the web page with the recorded address.

Finally, assume that the user wants to send an e-mail to a friend. He uses the control function of the input unit to record the command "e-mail" on the mouse pad. Recognition of this command by the signal-processing means results in the means generating a command to the computer which causes it to open the e-mail program. The user can then record the required e-mail address and even the content of the message using the scanner function.

As shown above, the user can conveniently carry out a number of different functions which comprise inputting information and controlling the computer 200 by means of just one input unit.

Of course, other functions can be integrated into the input unit in order to further increase its usability. An example is a function to record handwritten text,

which is described in the Applicant's Swedish Patent No. xxxxxxxx.

Other commands can be created in addition to those described above. A user can also himself define how recorded text is to be interpreted by the signal-processing means and in which control of the computer a particular recorded piece of text is to result.

The change described above between the different functions is carried out by the user pressing buttons on the input unit.

As an alternative to this, the input unit can itself detect that it is to change between different functions.

The input unit can, for example, be arranged to search for predetermined information in each image which is captured by the optical sensor 8. The predetermined information can, for example, be the pattern on the working field 120 of the mouse pad. When the processor 20 detects this pattern, it changes to the mouse function and processes the images in the way described above to provide positioning signals for the cursor on the display 201 of the computer 200. When the user thereafter places the input unit on a newspaper in order to scan in text, the processor 20 no longer detects the mouse pad pattern and so it knows that it is to change to the scanner function and process the images in the way described above for the identification of text and conversion of imaged text to character-coded format. This technique can also

be used for changing to the control function. The commands in the mouse pad's command field can be written in a particular way so that the processor can detect that the characters are not characters which are to be entered into the computer by the scanner function, but are characters which represent commands and are to be sent to the signal-processing means in order to be processed as such. The commands can, for example, be written in a particular size, particular font or particular line thickness.

As another example, the change can be implemented on the basis of change commands which are written in the command field of a mouse pad. When the user wants to change to scanner function he records the word "scanner" from the command field using the input unit. The processor 20 identifies this as predetermined information which indicates that it is now to carry out a scanner function.

Above the pattern on the mouse pad 100 is described as an irregular pattern and the mouse function is described as being achieved by determination of the relative position of the recorded images. In another embodiment, the pattern on the mouse pad can be a position-coding pattern, which systematically codes positions over the whole of the mouse pad. In this case the mouse function can be based on reading off positions using the position-coding pattern. In addition the change to mouse function can be based on recognition of the position-coding pattern. In addition particular positions or posi-



tion areas (also called domains) can be dedicated to particular functions, for example those corresponding to the different commands in the command field. When the processor detects a particular position, it determines which function corresponds to this position. In this way the input unit can be caused to change from one function to another function by placing it in a particular position on the mouse pad. Different domains of the position-coding pattern can also be dedicated to commands for controlling the computer 200. Instead of the signal-processing means in the computer 200 detecting predetermined information in the text which is entered, they can thus detect positions in the form of coordinates and identify which command is to be created to control the computer 200. For example, if the user wants to open the e-mail program in the computer 200, he can place the input unit on the mouse pad in a position where it says "e-mail". The optical sensor 8 records an image of the position-coding pattern in this position. The processor identifies which position, that is which coordinates, corresponds to the position-coding pattern in the image. It sends the coordinates to the signal-processing means in the computer 200. The signal-processing means identify that these coordinates mean that they are to create a command to the computer which causes it to open the e-mail program.

The mouse pad can thus be divided into position areas or domains with different functions. An additional example of this is that one area can be dedicated to relative mouse function (the cursor is moved in the same way as the input unit) and another area to absolute mouse function (the cursor is placed in the position which corresponds to the position of the input unit on the mouse pad). The input unit itself understands which function it is to use on the basis of whether the position-coding pattern (and hence the identified coordinates) belongs to one or the other area. Of course, alternatively the same surface can be used for the relative and absolute functions and the change can be carried out by means of change commands in the way described above.

A further example is that the mouse pad can have an area which is dedicated to a scrolling function. The input unit can thus be a mouse with various mouse functions. It can also be a mouse which, in addition to controlling a cursor on a computer, can control other functions of the computer or other electronic devices, such as mobile telephones or PDA.

The above example is just one example of how the arrangement according to the invention can be designed. Based on the summary of the invention, experts in the field can achieve a number of variants of this example.

What we claim and desire to secure by Letters Patent is:

1. An arrangement for controlling an electronic device, characterized by an input unit with an optical sensor for recording text by imaging this by means of at least one image, and signal-processing means for identifying predetermined information in the imaged text and for controlling the electronic device dependent upon said predetermined information.

2. An arrangement according to claim 1, wherein the predetermined information consists of at least one predetermined character and wherein the signal-processing means are arranged to generate a command associated with said character for controlling the electronic device.

3. An arrangement according to claim 1 or 2, which arrangement comprises a reading pen function.

4. An arrangement according to any one of the preceding claims, which arrangement comprises an optical mouse function for controlling a cursor on a display on the electronic device.

5. An arrangement according to any one of the preceding claims, which arrangement can be changed between at least a first function mode and a command mode, in which the signal-processing means are arranged to carry out said identification of predetermined information in the recorded text and control of the electronic device.

6. An arrangement according to any one of the preceding claims, in which the signal-processing means are at least partially located in the same casing as the electronic device.

7. An arrangement according to any one of the preceding claims, wherein the input unit is arranged to communicate with the electronic device by wireless means.

8. An arrangement according to any one of the preceding claims, wherein the signal-processing means are arranged in such a way that when they identify an address for electronic mail in the recorded text, they cause the electronic device to open a program for electronic mail.

9. An arrangement according to any one of the preceding claims, wherein the signal-processing means are arranged in such a way that when they identify a web address in the recorded text, they cause the electronic device to open a web search program.

10. An arrangement according to any one of the preceding claims, wherein the signal-processing means are arranged in such a way that when they identify a telephone number in the recorded text, they cause the electronic device to phone the telephone number.

11. An arrangement according to any one of the preceding claims, comprising a product on which a number of command words are indicated.

12. A method for controlling an electronic device, comprising the steps:

recording text by means of a hand-held input unit,  
by imaging this by means of at least one image,

identifying predetermined information in the imaged  
text, and

controlling the electronic device dependent upon the  
imaged text.

13. An input unit with at least a first and a second  
function, comprising image-capturing means for capturing  
images and image-processing means for processing the  
images to achieve said two functions, c h a r a c t e r -  
i z e d in that the input unit is arranged to change from  
the first to the second function when the image-process-  
ing means detect predetermined information in one of said  
images.

14. An input unit according to claim 13, wherein  
said predetermined information is a predetermined pat-  
tern.

15. An input unit according to claim 13 or 14,  
wherein the input unit is arranged to change from the  
second function to the first function when it detects  
other predetermined information.

16. An input unit according to any one of claims  
13-15, wherein said predetermined information consists of  
a position-coding pattern, preferably an absolute  
position-coding pattern.

17. An input unit according to any one of claims 13-16, wherein the first function is a mouse function and the second function is an input function, preferably a scanner function.

## Abstract of the Disclosure

An arrangement for controlling an electronic device has an input unit with an optical sensor for recording text by imaging this using at least one image, and signal-processing means for identifying predetermined information in the imaged text and for controlling the electronic device dependent upon said predetermined information.

